



Space Weather Report

The 9th grade students from
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OUR TEAM

- Team members:

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- Coordinating teacher: Stoica Ioana



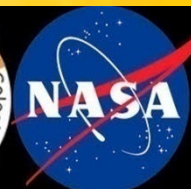
SECTIONS

- Sunspot regions
- Storm signals
- Magnetosphere
 - Auroras



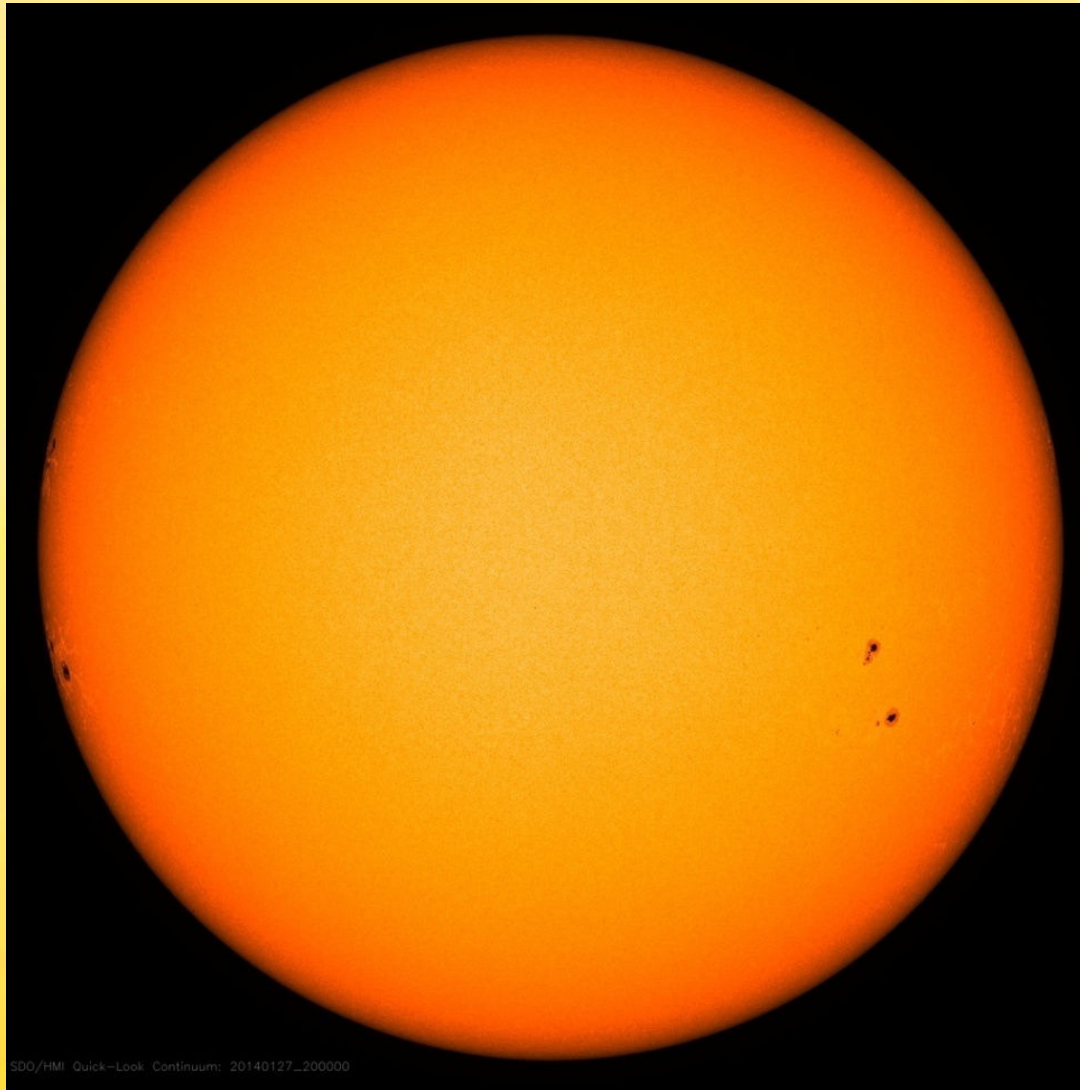
SUNSPOT REGIONS

SDO/HMI Quick-Look Continuum: 20140123_194500



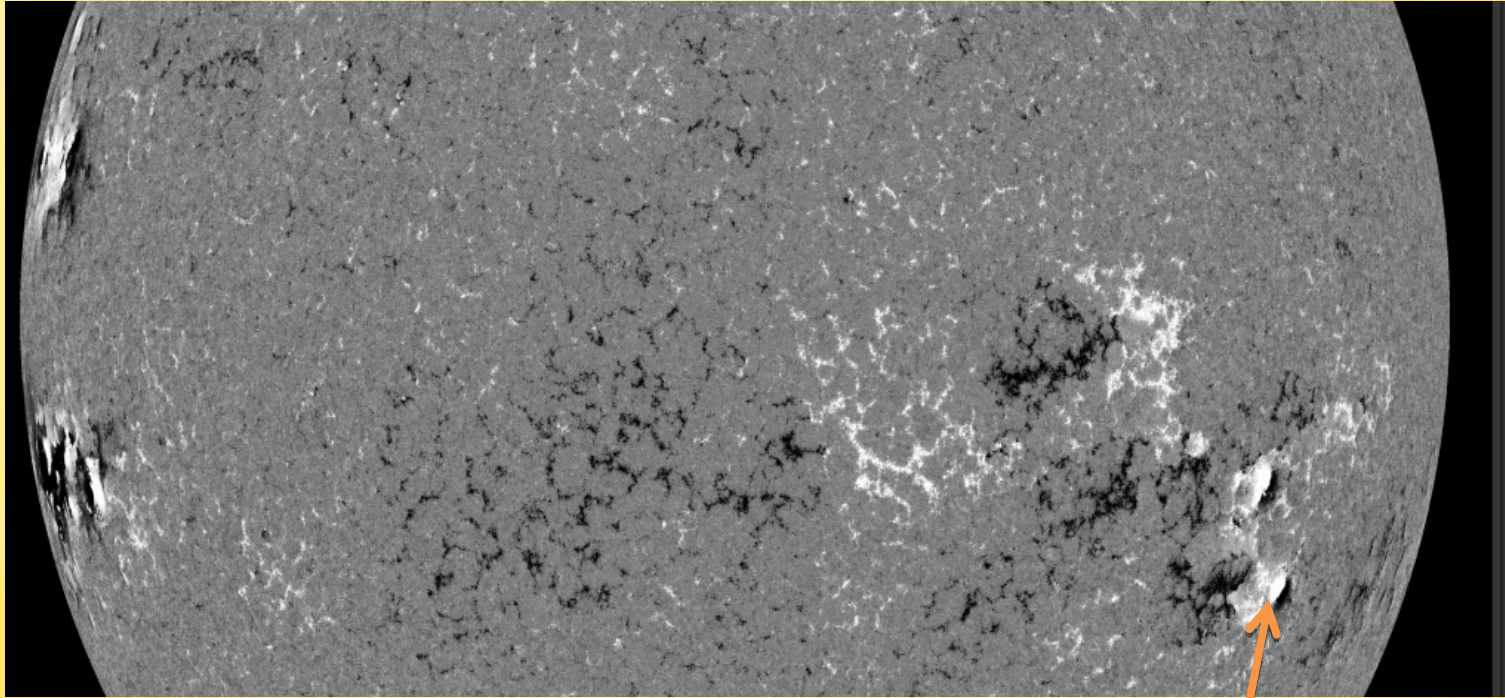
- After we analyzed the images, we observed a few sunspots on the surface of the Sun.
- Compared with the Sun's equator, some of them are lower, some of them are higher and some are located near it.
- We observed the images and we saw 2 sunspots that are 2 times bigger than Earth. There are, also, some sunspots smaller than Earth.





- We can see one cluster of sunspots, as in this image.
- We can see about 4 sunspots.

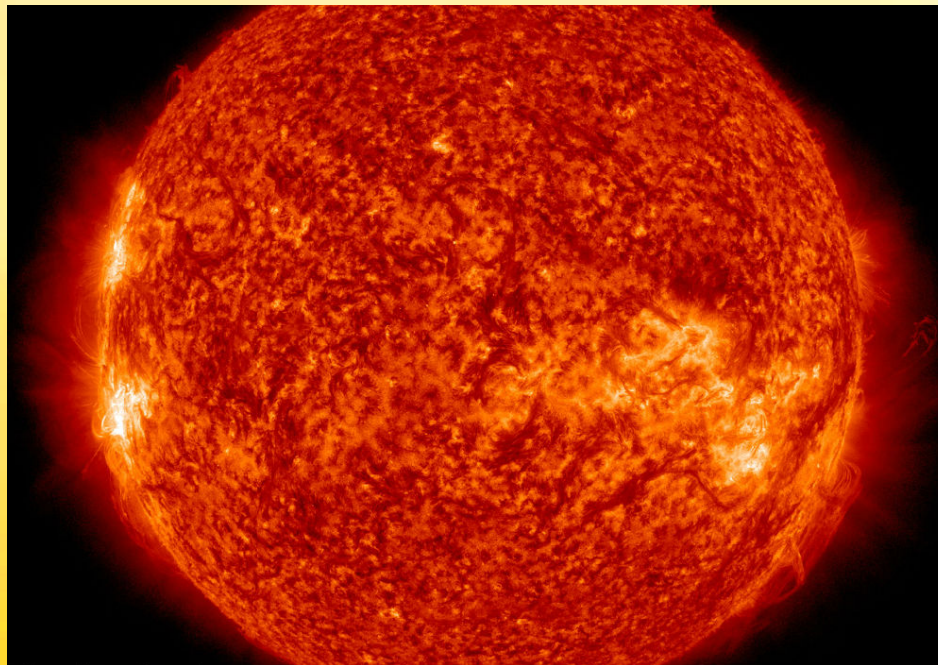




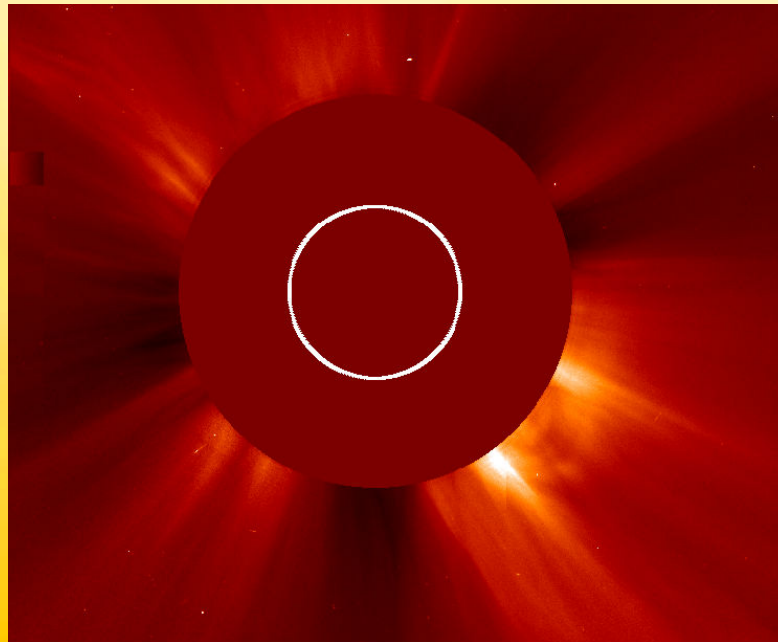
- We observed black and white areas on the magnetogram and those areas seem mixed together.
- There is a better chance for a solar eruption from that location.



- The sunspots are caused by magnetic activity and the solar flares and coronal mass ejections appear in these magnetically active places.
- Accordingly, the active places that can be identified in the images are near the sunspots.

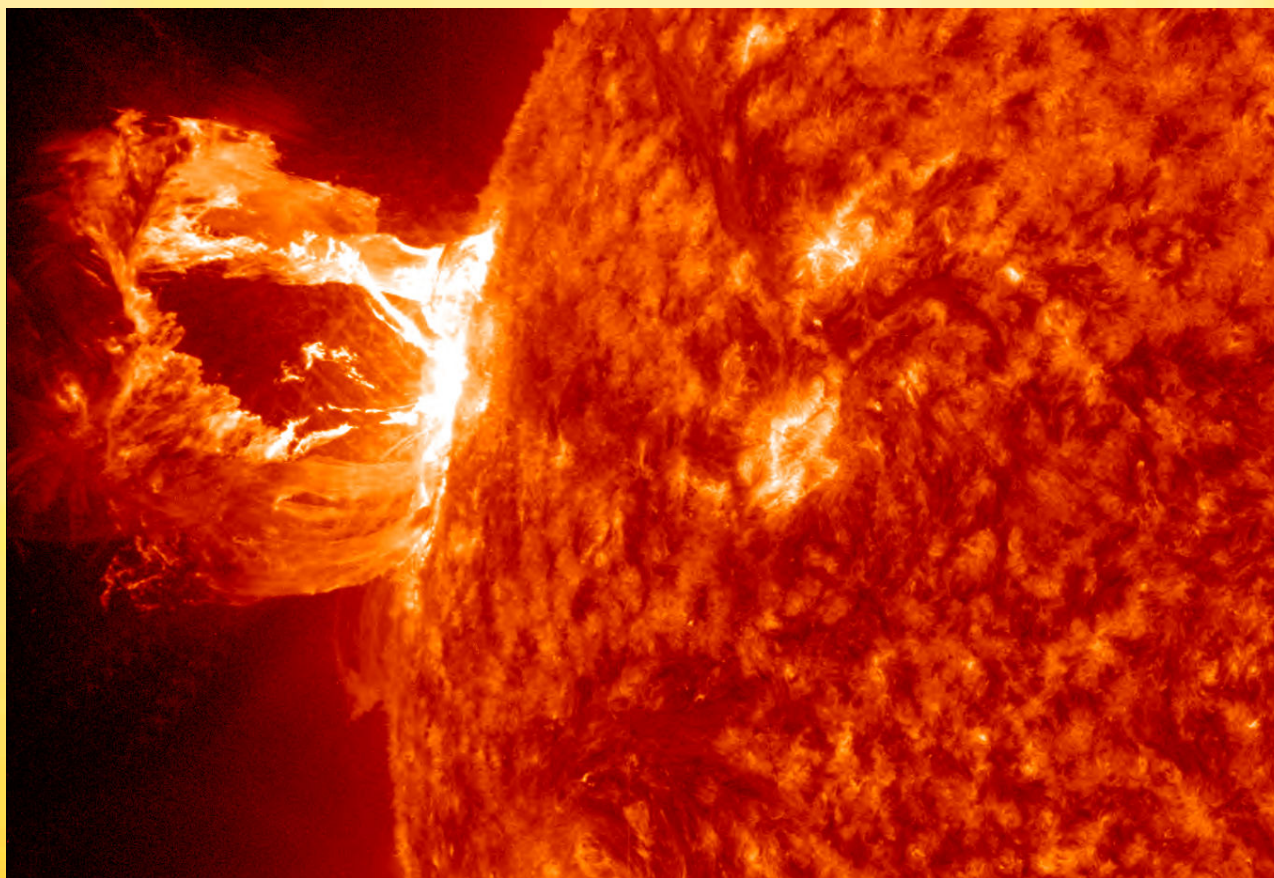


- We observed that CMEs are leaving the surface of the Sun in the south-eastern hemisphere.
- So, we can expect a storm on the Earth soon.
- It takes 1 to 4 days for these particles to reach Earth.
- When this happens the magnetic field of the Earth is affected and it decrease. During this period auroras can appear and strong electrical currents travel the Earth's surface.

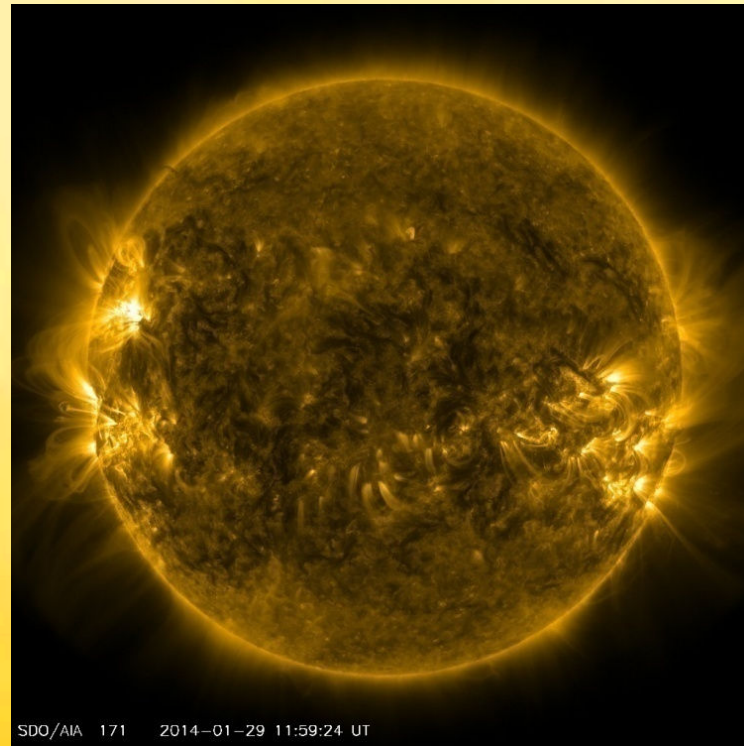


- Sunspot regions that exist today could be a source of solar storms.
- As we can see in the images, the sunspots occur near the magnetically active regions from the Sun.
- Thus, we can identify several coronal mass ejections and solar flares that are leaving Sun's surface.
- Also, we can see the halo effect.
- Therefore, we can expect a solar storm in the near future.

STORM SIGNALS



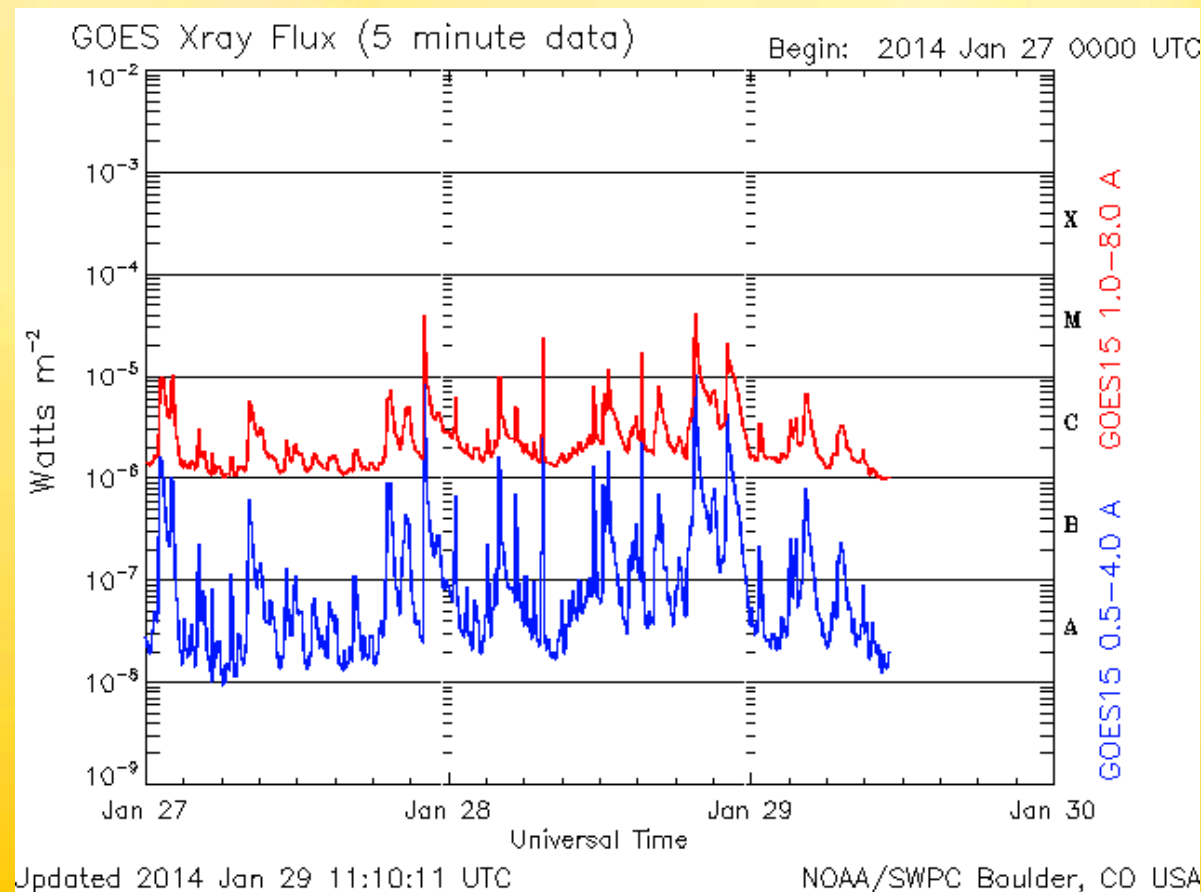
- We collected the data on January 29th .
- We have noticed several solar flares and coronal mass ejections today, as the picture below illustrates.



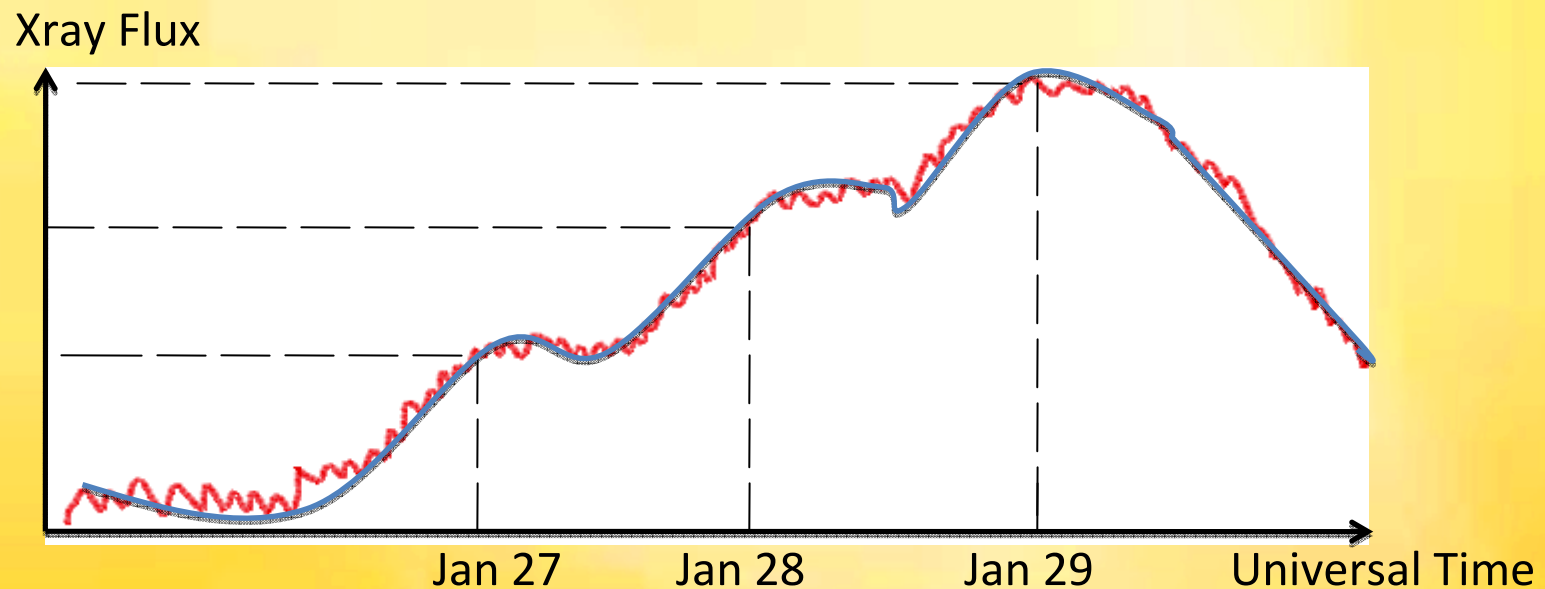
- Since our last entry, on the January 27th, x-ray emissions from the Sun increased.
- Today, on the 29th, they began to decrease. We noticed solar flares and CMEs on the side of the Sun that faces our planet. So, we believe that we are observing a possible solar storm that could affect Earth. We have observed that the x-ray emissions from the Sun remained constant, slightly above level M. Their increasing tendency observed today suggests that signs of a solar storm should be visible.
- Auroras are visible on Earth today, January 29th.
- We can conclude that there are signals recorded today, indicating that a solar storm might be heading towards Earth!



The graphic below plotshows that the intensity of X-ray emissions from the Sun, represented by the red line, during January 27th, 28th and 29th.



The graphic that indicates that a storm was emitted from the sun should show a gradual rise and fall in the signal received, as in the image below:

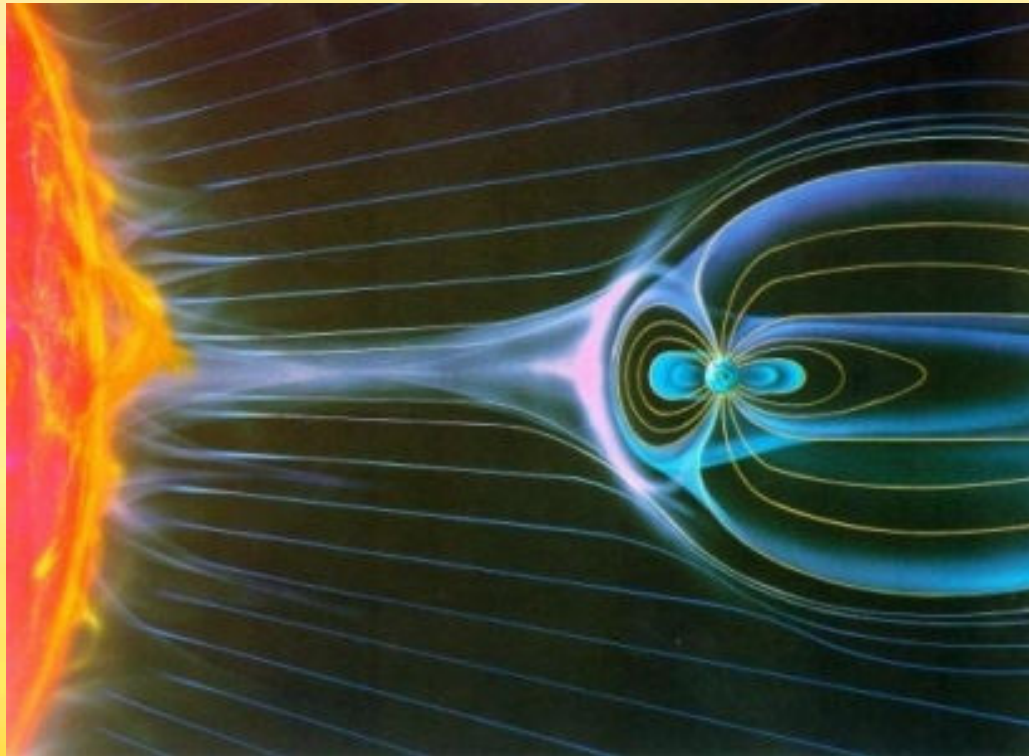


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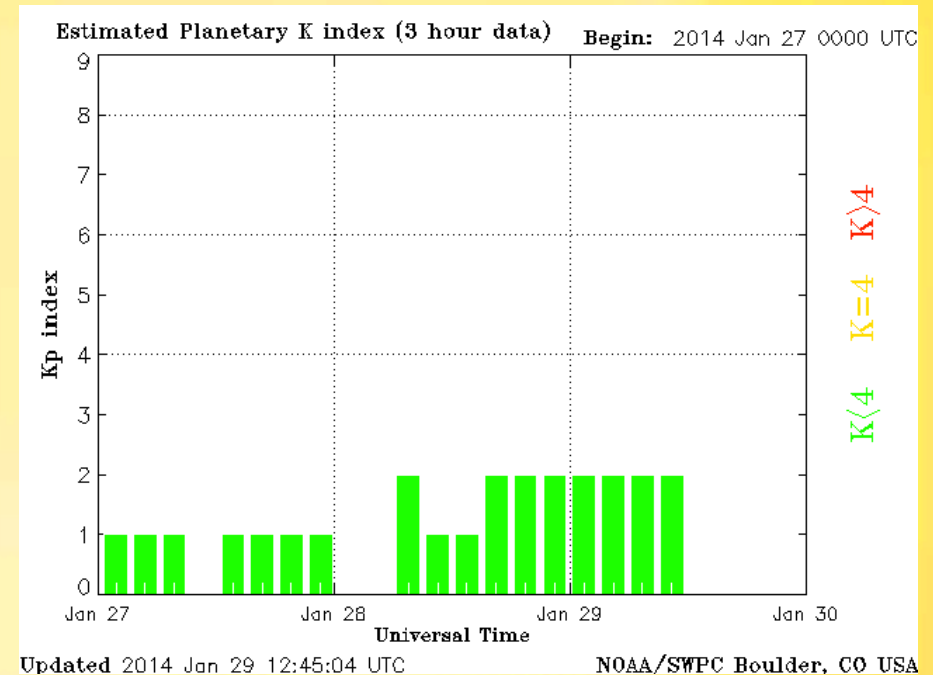
- http://www.nasa.gov/images/content/683967main_Aug31-CME-4Panel.jpg
- <http://sunearthday.nasa.gov/spaceweather/>
- http://www.nasa.gov/mission_pages/sunearth/news/News041612-M1.7flare.html



MAGNETOSPHERE



- This graph covers 3 days: January 27th, 28th, 29th.
- The highest K index is:
 - On 27th: K index = 1
 - On 28th: K index = 2
 - On 29th: K index = 2

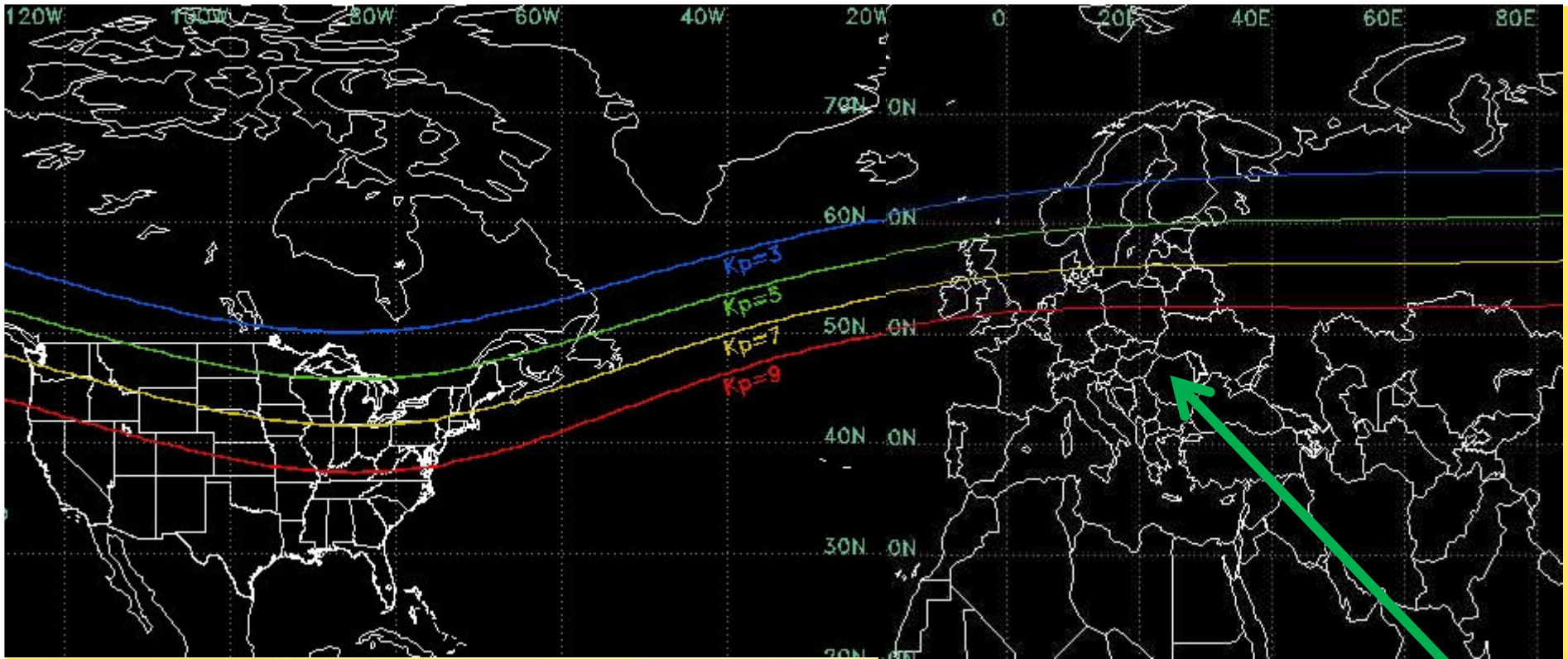


There isn't any Kp value of 3 or higher.



We used the interactive map and we found out that for our country, Romania, the longitude is 25E, latitude 45N and the corrected geomagnetic latitude is 40.





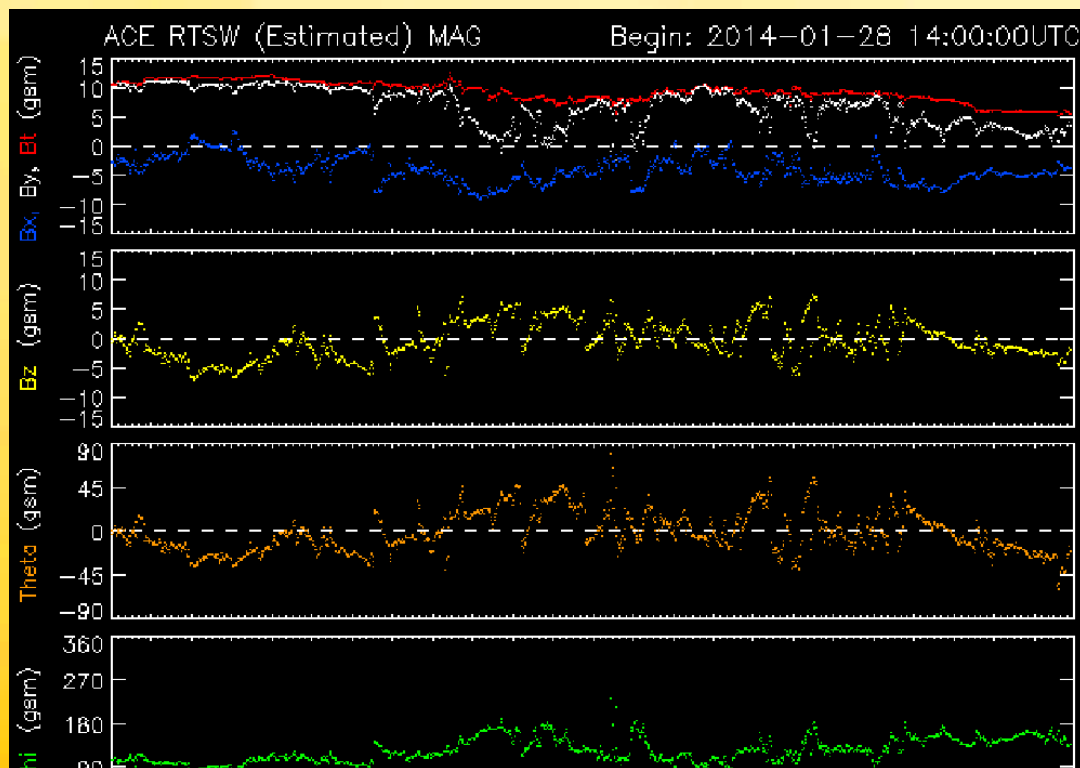
- So we could see auroras in our area, the Kp level would have to be 9 or higher because we are too southern for the normal auroras.
- So we could see an aurora, it should be a immense disturbance in Earth's magnetic field.



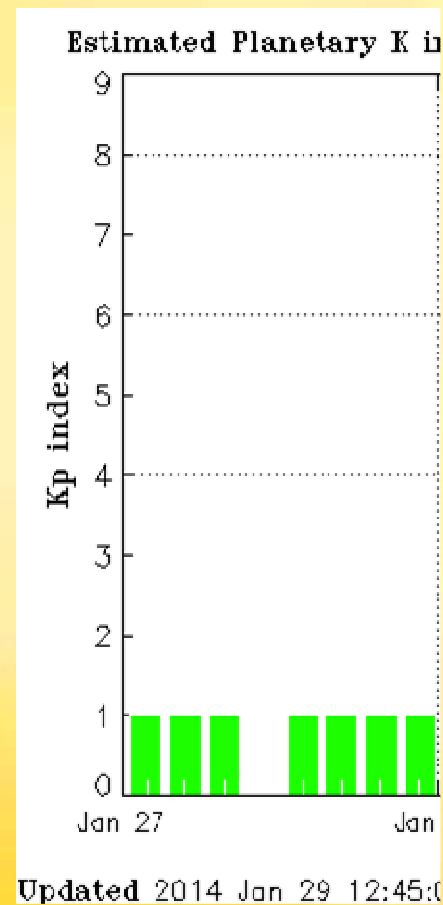
- There are areas in the world that might see auroral activity, based on this data, in the next few hours.
- At this hour (13 UTC) the activity is very low (Kp 2) and in the next few hours it will be constant, so only the very northern areas - Russia, Canada, Alaska, Greenland and Iceland - will see the auroras.



- The current level of geomagnetic storm, as we can see on the yellow graph (Bz) have a value between -2 and -4 and indicates a medium geomagnetic storm activity.
- It seems that the last geomagnetic storm activity that arrived at the ACE satellite began at 11 UTC.
- After we analyzed the graph, we concluded that the storm will arrive on Earth in about one hour.



- There hasn't been any measurable disturbance in the Earth's magnetic field.
- The Magnetosphere graph indicates a very low level of geomagnetic storm.



REFERENCES

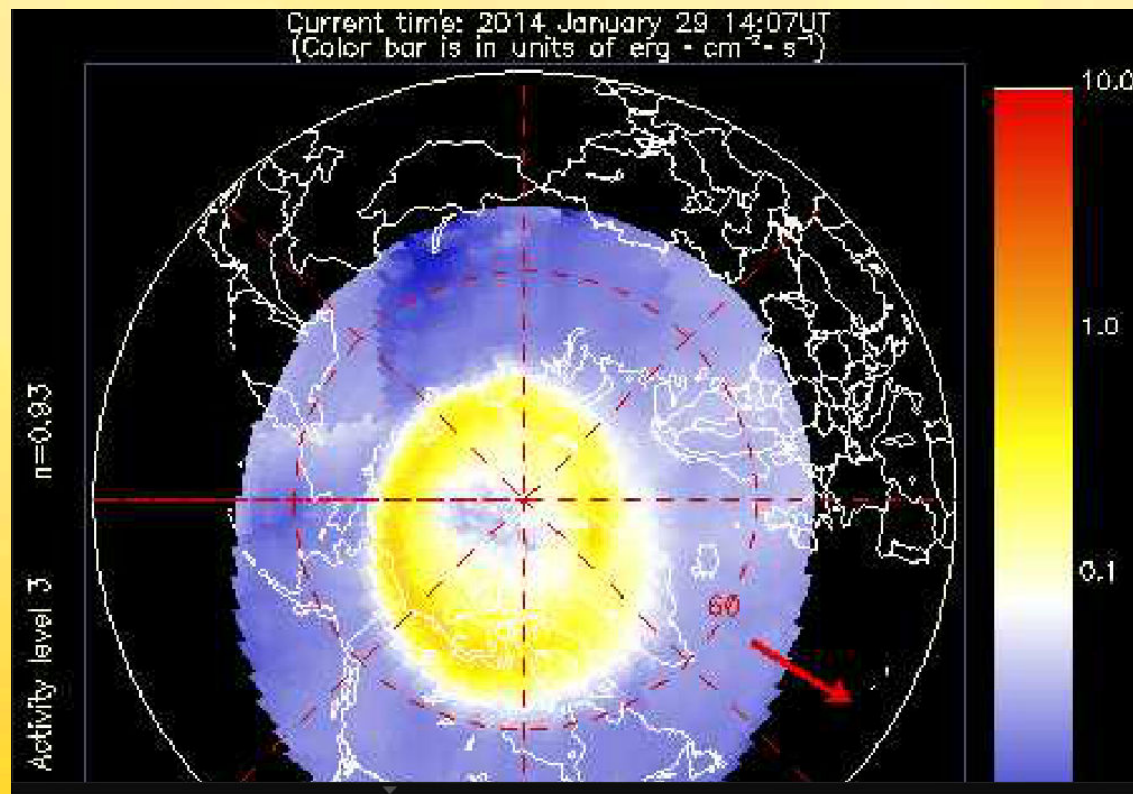
- <http://www-spod.gsfc.nasa.gov/Education/MIntro.html>
- <http://www.solarham.net/viewing.htm>



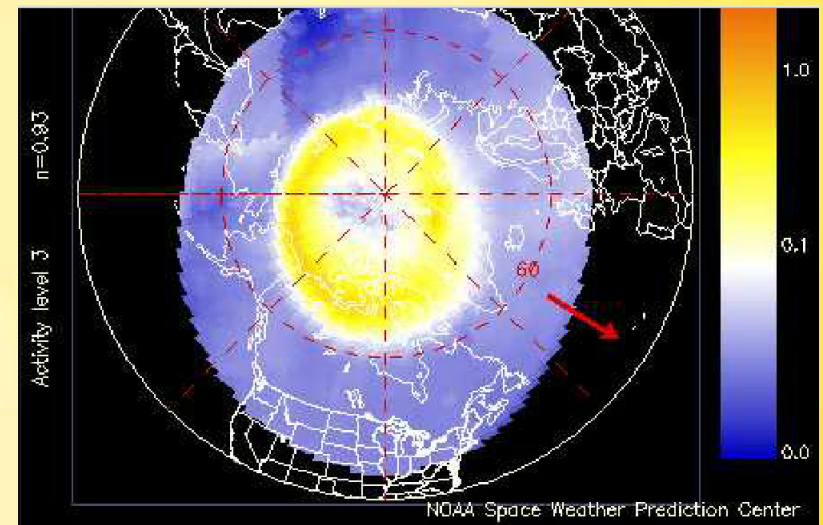
AUORAS



The intensity of the storm is moderate at the North Pole and gradually decreases to low intensity in the southernmost regions.



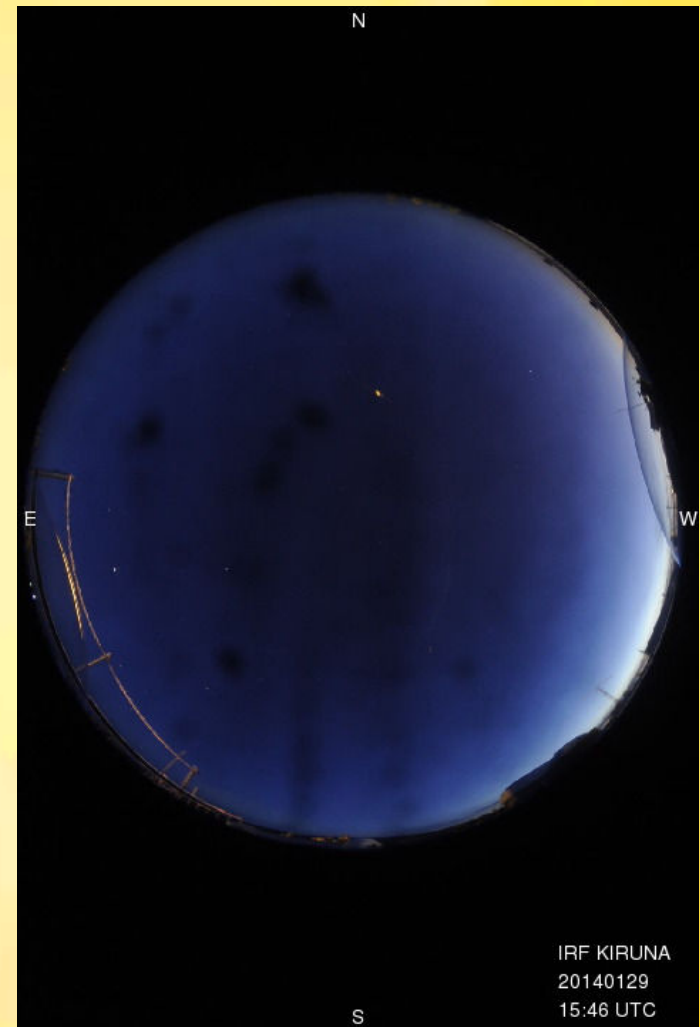
The southernmost extent of the auroras is in The United States of America , in the states Missouri, Illinois and Kansas.



- If the intense auroral activity expands down, you can expect to see auroras into the northernmost states of The United States.
- Also you can expect to see auroras in central United States, if a powerful magnetic storm occurs.
- You can see an aurora as far south as Florida and Texas, if there is a mighty geo-magnetic storm there.



- The image was taken on January 29th, 2014, at 15:46 UTC.
- In the this keogram, we can easily notice the clouds near Norway that seem to be auroras by their white shade.
- We can observe low auroral activity.
- Since nothing else can be perceived, either there was no auroral activity, or clouds ensued in diffuse images.



- Auroras have been seen within the last 24 hours due to a solar storm.
- At the high Western longitude we have observed, according to the Kiruna All-Sky Camera, medium auroral activity in the last 24 hours because of the yellow color region.
- Auroras have been seen in the last 24 hours (on the January 29th), towards the East and West from the pole.
- However, the auroral activity has not been very intense and the auroras have been faint and small, shining in colors between red and yellow.



REFERENCES

- <http://www.nasa.gov/content/goddard/sun-unleashes-first-x-class-flare-of-2014/>
- <http://www.profudegeogra.eu/harta-politica-a-sua/>
- <http://www.irf.se/allsky/rtasc.php>



ACKNOWLEDGEMENTS

- We would like to thank NASA and the IRIS Challenge Team for this fantastic project.
- Also, we would like to thank our teachers and parents for their support.

